



# **Solar Micro Grids Networks**

For creating access to clean  
reliable and affordable  
power  
&  
**Market Potential in India**

Workshop by MEI & GIZ on “Mini-Grids as New Market Opportunities:  
Experiences from Science and the Private Sector”

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# Rural Electrification in India: Current Scenario

26 % population : no access to grid electricity

- 35 % relies on kerosene for lighting (inefficient, *unhealthy & unsafe*)

\$2 billion/yr untapped market in off-grid distributed energy

- Av off-grid rural household spends ₹ 120/ month (1.70 €)

Off-grid demand is unmet

- Use of kerosene, diesel & disposable batteries
- Market imperfections, creating opportunities for social ventures to provide solutions

# Finding Solutions



Solution	Advantages	Issues
Solar charging station	<ul style="list-style-type: none"> <li>• Pay per use</li> </ul>	<ul style="list-style-type: none"> <li>• Grant driven</li> <li>• Lack of ownership (rental)- Maintenance</li> <li>• Dependency on station</li> </ul>
Solar portable Lights	<ul style="list-style-type: none"> <li>• Ownership</li> <li>• Independence</li> </ul>	<ul style="list-style-type: none"> <li>• Limited service</li> <li>• Low incentives for sales team</li> </ul>
Solar home systems	<ul style="list-style-type: none"> <li>• Satisfactory services</li> <li>• Sales margin</li> </ul>	<ul style="list-style-type: none"> <li>• High capital cost</li> <li>• Difficult to access finance</li> </ul>

# Lessons Learnt

People are willing to spend ₹120 (1.70 €) p.m. for meeting their basic lighting & mobile charging needs.

- Consistency in supply - directly linked to revenue collection

Mistrust in RE technology

- Poor after sales services by suppliers

**Conclusion**

- Not comfortable to pay upfront, but willing to pay per use
- Grid like solution required (maximum clients)

# Solar Micro Grid (Design)

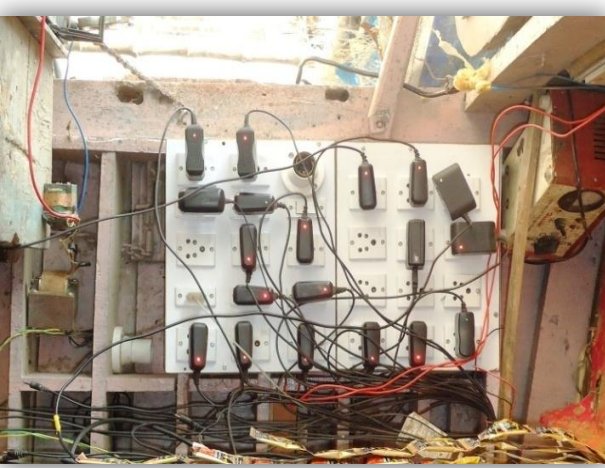
Village level ,centralized generation and distribution (5.5 kW capacity)

- Reliable power supply to 175 HHs
- Train and employ local youth – O&M
- Governed by village energy committee

Micro grids tailored to the specific needs

- 3 lights (six hours per night)
- Mobile phone charging Facility





# Implementation Process

Identification

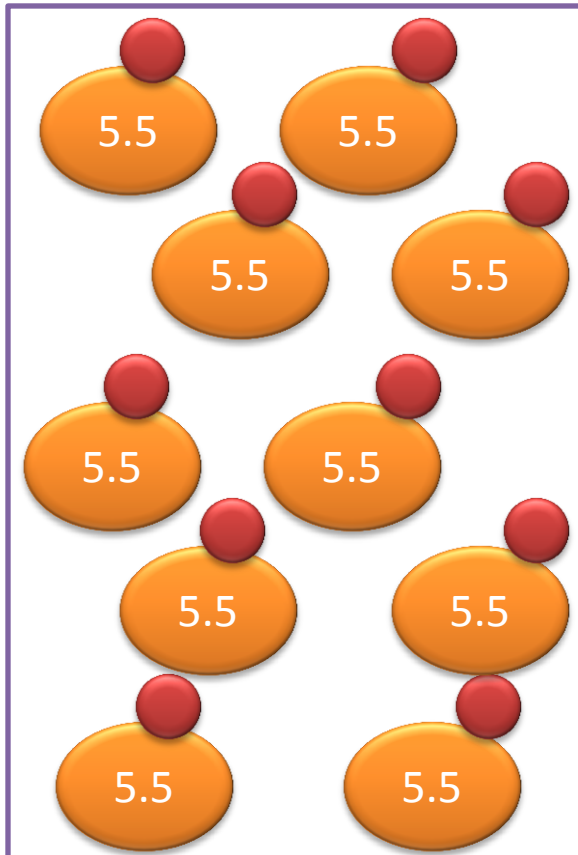
Social Process

Installation

Training



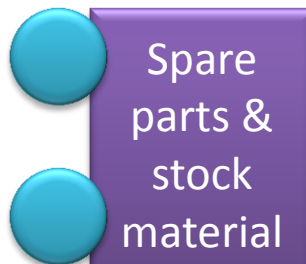
# Operational Arrangement- Solar Micro Grid Network



Network of 10 solar micro-grids having 10 operators and 10 village energy committees

## Local NGO

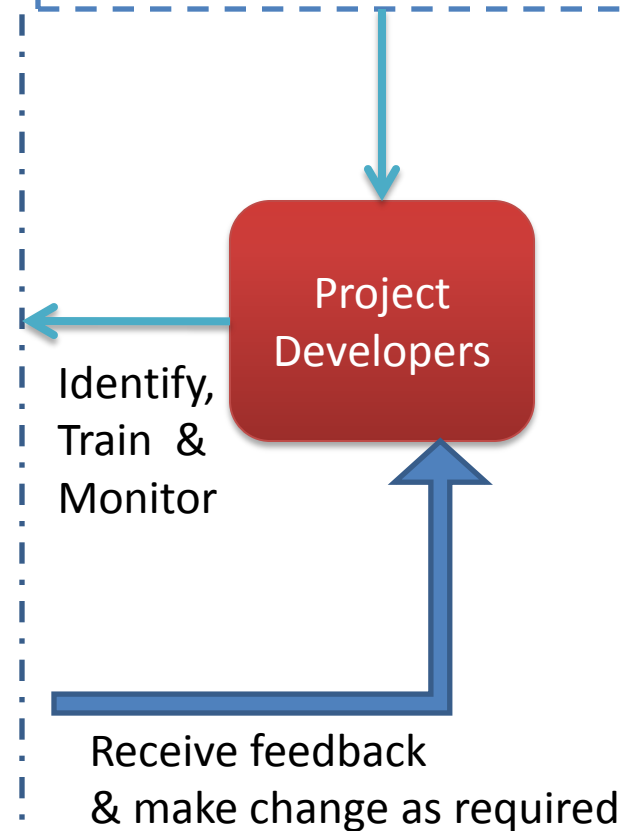
Managing all the operations of the plant and monitoring them



Technical Resource centers with 2 technical supervisors

## Capital

- MNRE : CFA
- Corporate Investors
- Local Entrepreneurs



# Comparison of Existing Grid Systems in Market

Type of Systems	Tariff (per kWh)	Advantages	Disadvantages
Central Grid	₹ 3.5 (€ 0.05)	<ul style="list-style-type: none"> <li>• Cheap</li> <li>• Load flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Inconsistent &amp; unreliable</li> <li>• Poor quality</li> <li>• Capital intensive (Gov.)</li> </ul>
<b>Current Model (Solar Micro Grid)</b>	<b>₹ 55 (€ 0.8)</b>	<ul style="list-style-type: none"> <li>• <b>Quick ROI (Developer)</b></li> <li>• <b>Reliable &amp; good quality</b></li> <li>• <b>Faster implementation</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Covers only basic needs</b></li> <li>• <b>High tariff</b></li> <li>• <b>No flexibility in usage</b></li> </ul>
Conventional DG micro grids	₹ 90-120 (€ 1.6)	<ul style="list-style-type: none"> <li>• Alternate to kerosene</li> <li>• Minimum CAPEX (Provider)</li> <li>• Easy technology (Provider)</li> </ul>	<ul style="list-style-type: none"> <li>• High Tariff</li> <li>• Only lighting</li> <li>• Polluting &amp; fuel subsidy</li> </ul>
Mini Grids	₹ 30 (€ 0.45)	<ul style="list-style-type: none"> <li>• Reliable</li> <li>• Load flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Higher breakeven period (Developer)</li> <li>• Difficulty in scaling up</li> </ul>



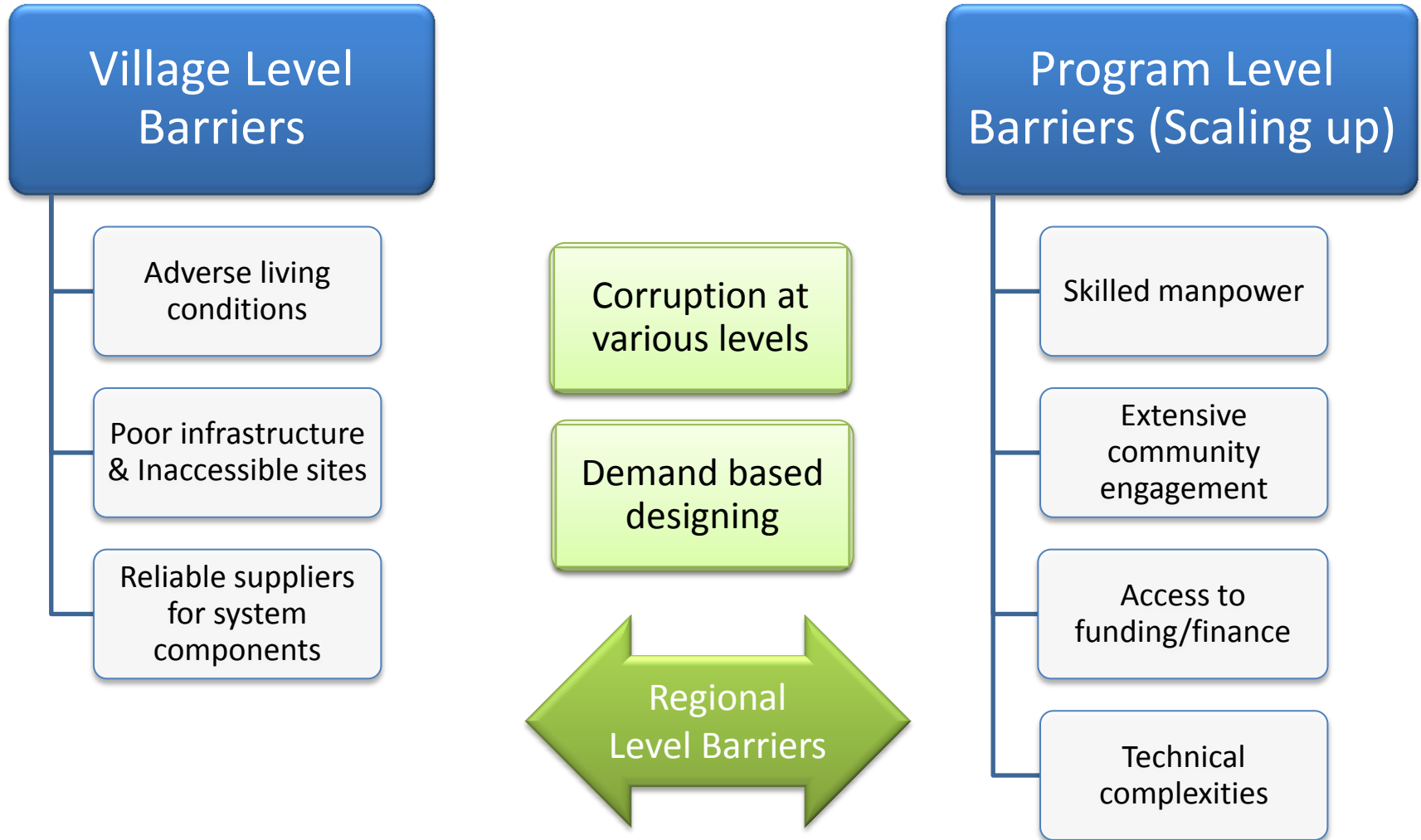
# Market Scenario



There are a number of micro/mini grid operators in India operating for the last 5 years-

- Husk Power Systems, Desi Power, Saran Renewable Energies, Naturetech Infra, Nextgen Tech, MeraGao Power and Development Alternatives in particular
- Till now even, aggregated have, reached less than 1% of the off-grid population

# Challenges





# Thank You

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